

WHAT IS CLAIMED IS:

1. A packet switch apparatus sending a packet stored in a common memory to a plurality of paths having
5 different bit rates, comprising:

storing means for storing a packet to be sent to at least one path in a free space of the common memory;

enqueuing means for enqueuing a pointer indicating said packet stored in the shared memory to queues
10 corresponding to paths to which said packet is scheduled to be sent;

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sending means for dequeuing the pointer enqueued by said enqueuing means for each of the queues corresponding to the paths and sending the packet
15 indicated by the pointer dequeued to the paths corresponding to the queues at the respective transmission bit rate thereof;

discarding means for discarding, on a queue basis, pointers from a head thereof in which it is determined
20 that the number of pointers enqueued by said enqueuing means exceeds a predetermined threshold value; and

free-address management means for setting the free space of the common memory that is occupied by the packet to a busy state and changing the free space that is now in
25 the busy state to a free state when the pointer indicating said packet is dequeued or discarded from all of the queues to which said packet is scheduled to be sent.

2. The packet switch apparatus according to claim
1, wherein said sending means comprises schedulers
provided to the respective paths, said schedulers
5 dequeuing the pointer enqueued by said enqueueing means.

3. The packet switch apparatus according to claim
1, wherein the paths include a virtual path to which an
arbitrary output bit rate based on an ensured band is
10 designated.

4. The packet switch apparatus according to claim
1, wherein said discarding means sets a discard initiation
threshold value for each of the queues, and starts to
15 discard pointers from one of the queues if the number of
pointers enqueued to said one of the queues exceeds said
discard initiation threshold value.

5. The packet switch apparatus according to claim
20 4, wherein said discarding means sets a discard end
threshold value for each of the queues, and continues to
discard pointers until the number of pointers enqueued to
each of the queues becomes equal to or smaller than the
discard end threshold value.

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6. The packet switch apparatus according to claim
1, wherein said free-address management means manages

status of enqueueing and dequeuing of pointers on the path basis by using a set of flags that is provided for each address of the common memory, the flags respectively corresponding to the paths.

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7. The packet switch apparatus according to claim 1, wherein said free-address management means returns the address of the free space to the free state when said free-address management means turns ON all of the set of flags related to each of the paths, said all of the set of flags including a flag related to a path to which said packet is not scheduled to be sent, a flag related to a path to which said packet has been sent, and a flag related to a path in which the pointer indicating said packet has been discarded.

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8. A multicasting method of sending a packet stored in a common memory to a plurality of paths having different bit rates, comprising the steps of:

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storing a packet to be sent to at least one path in a free space of the common memory;

enqueueing a pointer indicating said packet stored in the shared memory to queues corresponding to paths to which said packet is scheduled to be sent;

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dequeuing the pointer enqueued for each of the queues corresponding to the paths and sending the packet indicated by the pointer dequeued to the paths

corresponding to the queues at the respective transmission
bit rate thereof;

discarding, on a queue basis, pointers from a head
thereof in which it is determined that the number of
5 pointers enqueued exceeds a predetermined threshold value;
and

setting the free space of the common memory that
is occupied by the packet to a busy state and changing the
free space that is now in the busy state to a free space
10 when the pointer indicating said packet is dequeued or
discarded from all of the queues to which said packet is
scheduled to be sent.

9. The multicasting method according to claim 8,
15 wherein the step of dequeuing said pointer dequeuing the
pointer enqueued uses schedulers respectively provided to
the paths.

10. The multicasting method according to claim 8,
20 wherein the paths include a virtual path to which an
arbitrary output bit rate based on an ensured band is
designated.

11. The multicasting method according to claim 8,
25 wherein the step of discarding pointers starts to discard
pointers from one of the queues if the number of pointers
enqueued to said one of the queues exceeds a discard

initiation threshold value defined for each of the queues.

12. The multicasting method according to claim 11,
wherein said step of discarding pointers comprises a step
5 of setting a discard end threshold value for each of the
queues, and continuing to discard pointers until the
number of pointers enqueued to each of the queues becomes
equal to or smaller than the discard end threshold value.

10 13. The multicasting method according to claim 8,
wherein the step of setting an address comprises a step of
managing status of enqueueing and dequeuing of pointers on
the path basis by using a set of flags that is provided
for each address of the common memory, the flags
15 respectively corresponding to the paths.

14. The multicasting method according to claim 8,
wherein the step of setting an address comprises a step of
returning the address of the free space to the free state
20 when turning ON all of the set of flags related to each of
the paths, said all of the set of flags including a flag
related to a path to which said packet is not scheduled to
be sent, a flag related to a path to which said packet has
been sent, and a flag related to a path in which the
25 pointer indicating said packet has been discarded.